Pediatric Endoscopic DCR: The Outcome in 50 Patients

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Abstract Congenital nasolacrimal duct obstruction is a very common condition affecting 20 % of infants. Pediatric DCR is indicated when there is no response to previous therapy like probing, or is associated with recurrent dacryocystitis. This is a retrospective case series study of 50 pediatric patients who underwent endoscopic DCR in two centers, Jordan University Hospital/Jordan, and Mosul teaching and private hospitals/Iraq. The age ranged from 3 to 12 years with a mean of 6.2 years. The overall success rate of endoscopic DCR was 90 %, and failed cases were mainly due to presaccal obstruction. No major complications were reported, but minor complications occurred in about 60 % of cases. As a conclusion, endoscopic DCR is a safe and effective procedure in pediatric age group.

Keywords Endoscopic DCR (EDCR) · Pediatrics

Introduction

Epiphora in children is a very common condition affecting 20 % of infants during the first year of life because of a persistent membranous web at Hasner's valve. It is known

as congenital nasolacrimal duct obstruction (CNLDO), and about 90 % of these obstructions resolve spontaneously with simple conservative methods [1]. In persistent obstruction, probing is performed to relieve the obstruction, which often results in successful resolution of epiphora [2]. Consequently, pediatric DCR is not the first line treatment for children with symptomatic common CNLDO, and it is indicated when there is no response to previous therapy like probing, or is associated with recurrent dacryocystitis [3].

Endoscopic DCR is relatively recent surgery for nasolacrimal duct obstruction, thus pediatric cases were dealt with very cautiously because of the narrower nasal dimensions.

The aim of the study is to assess the outcome of the authors' cases of endoscopic DCR in pediatric age group and to compare it with others' experience. Second is to assess predictors of success of surgery and causes of failure.

Patients and Methods

The charts of all pediatric patients, for whom endoscopic DCR was done in the period from 2007 to 2012, were reviewed. Surgeries were done by the authors in two centers, Jordan University hospital, and Mosul teaching and private hospitals.

This included 50 pediatric patients, who had 55 endoscopic DCRs and their age ranged from 3 to 12 years with a mean age of 6.2 years. They were referred from their ophthalmologists with epiphora and/or recurrent dacryocystitis. Ophthalmological assessment included syringing of the lacrimal passages to prove the obstructive nature of the problem when irrigated fluid failed to pass into the

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nose. They all had at least one attempt of probing which failed to resolve the patient symptoms.

All patients were assessed preoperatively by the authors in the outpatient as well as in the private clinics and full ENT examination was done including endoscopy in cooperative children which was done under local anesthesia and using 2.7 mm 0° flexible endoscope.

The level of obstruction was not decided until the time of surgery when the status of the sac and lacrimal passages were assessed. Due to the lack of dacryocystography facility in our center, the assessment was mainly clinical.

Operative Procedure

All surgeries were done by the authors, including probing of the lacrimal passages. Surgeries were performed under general anesthesia in a supine position with a 30° head elevation.

The surgery is started by mucosal incision about 1 cm anterior to the anterior attachment of the middle turbinate, which is usually done by the sharp end of an elevator. This incision is then extended in a curve like fashion to the lower border of the middle turbinate. Then this piece of mucosa is dissected by the elevator back to the uncinate process and it is removed by forceps (Fig. 1). A drill with a diamond bur is used to remove the bone of the frontal process of the maxilla to expose the lacrimal sac (Fig. 2). After maximum sac exposure is accomplished, dilation of the lacrimal puncti and probing of the lacrimal canaliculi is done, and at this step the actual site of obstruction is assessed.

In all cases, the sac was widely opened and marsupialized and stents were inserted into the upper and lower canaliculi and tied with the knot in the nasal cavity (Fig. 2). Sometimes this is combined with application of gelfoam pieces over the marsupialized sac edges (Fig. 3). Then a slight nasal pack was inserted.

In cases of pure presacral obstruction which was found in two patients, the plan was to create an artificial path

Fig. 2 a Drilling of the frontal process of maxilla, b sac exposure, c sac incision, d stenting and marsupialization of sac

between the puncti and the sac in the nasal cavity using a 23 gauge ordinary needle, then probing was followed starting with smaller then gradually larger and tougher probes to establish the tract. This was immediately followed by stent insertion.

The pack was removed the day after surgery and broad spectrum antibiotics were prescribed for one week and the parents were instructed to instill normal saline spray frequently into the nose to prevent crusting around the stent.

The patients were followed up weekly for 1 month and in every visit, cleaning of the nasal cavity was done to avoid crusting and adhesions. Then they were seen twice monthly for the next 2 months. At the end of 3 months the stents were removed and this was done in the clinic with the exception of two patients who needed GA for removal of the stents. In patients with presacral obstruction the stents were kept for 6 months.

Fig. 1 a Mucosal incision, b flap elevation, c flap removal

Fig. 3 Application of gelfoam over the marsupialized edges of the sac

Results

A total of 50 pediatric patients, who had 55 endoscopic DCR were enrolled in this study. There were 21 males (42 %) and 29 females (58 %), the age ranged from (3–12 years) with a mean of (6.2) years.

In 45 patients, DCR was done in one side, left in 29 (58 %), right in 16 (32 %), and in five patients (10 %) bilateral DCR was done with 6 months interval between the two surgeries, so the total DCRs were 55 surgeries. Table 1 shows the demographic data of the patients.

The success of surgery was decided by symptoms improvement, which included disappearance of epiphora and recurrent dacryocystitis. In older cooperative children the fluorescein test was done by application of fluorescein in the conjunctival sac and endoscopic examination of the nose to visualize the dye coming into the nose through the new ostium.

These criteria of success were observed in 45 (90 %) cases. The follow up period ranged from 6 months to 3 years with a mean of 1 year. Those patients with post-saccal obstruction had success rate of 100 %.

Patients with presaccal obstruction had lower success rate. In three cases there was marked improvement of symptoms, but in the other two cases there was mild improvement, No revision surgery was done.

As shown in Table 2 there were no major complications, but minor complications namely (adhesions, minor epistaxis, bruises and lid edema) had occurred in 33 (about 60 %) of operated cases.

Discussion

The therapeutic approach in children with CNLDO differs from that used in adults. While DCR is the most common procedure in adults, it is carried out less frequently in children. It is indicated for children with persistent nasolacrimal obstruction refractory to probing, and in cases with chronic or recurrent dacryocystitis [4].

In the present series the majority of cases had probing twice before referral to surgery. Ten patients had probing 3 or 4 times. None of the patients had previous surgery or intubation of the lacrimal passages.

Table 1 Demographics of patients with DCR

Age	Number (no)	Sex		Side			Canalicular stenosis/obstruction
		Males	Females	Right	Left	Bilateral	
3 to <4	13	6	7	4	6	3	2
4 to <5	6	6	–	2	3	1	–
5 to <6	6	4	2	2	3	1	–
6 to <7	6	1	5	2	4	–	–
7 to <8	6	–	6	1	5	–	–
8 to <9	7	2	5	3	4	–	–
9 to <10	1	1	–	1	–	–	–
10 to <11	3	1	2	1	2	–	1
11–12	2	–	2	–	2	–	2
Total no and %	50	21	29	16	29	5	5
	100 %	42 %	58 %	32 %	58 %	10 %	10 %

Table 2 Complications of surgery

Adhesions	20 (40 %)
Bruises and lid edema	10 (20 %)
Epistaxis	3 (6 %)
Partial improvement	5 (10 %)
Middle turbinate to septum	12 (24 %)
Middle meatus adhesions	5 (10 %)
Inferior turbinate to septum	3 (6 %)

It has been noticed that the passage of the probe and the stents was smoother in cases with the least probing (once or twice), and it was more difficult in patients with repeated probing, in whom stenosis of the lacrimal passages was more evident. This may be explained that repeated probing may cause higher incidence of false tract especially when this is done by less experienced residents. We did not find in the literature the relation between the frequency of probing and the operative findings in DCR, yet this observation needs further evaluation.

Because the commonest site of obstruction is distal at the level of the valve of Hasner, which is the commonest indication for DCR, the success rate of endoscopic DCR is high in pediatric age group [2, 5, 6].

The reports on using EDCR in children are limited in the literature [2, 7–10], yet these studies proved the high success rate of primary endoscopic DCR in postsaccal obstruction [6, 8]. The success rates for endoscopic DCR in congenital NLDO in children have been evaluated with success rates quoted between 88 and 100 % [6, 7, 9, 12, 13]. Eloy et al. [10] achieved a complete resolution of symptoms in 9 of 10 primary EDCRs. Leibowitch et al. [11] in their study with 26 EDCRs report that they achieved clinical success rate in 92.3 %. VanderVeen et al. [9] achieved a complete resolution of tearing and discharge in 20 out of 22. In a study by Kominek et al. [4] which included 58 cases, the overall success rate was 87 %.

The success rate in our series is similar to the above mentioned studies. The cure rate in patients with persistent tearing from postsaccal obstruction in our study was almost 100 %, with an overall success rate of 90 %.

Besides, some of the above reported papers included patients under 1 year of age. In our series, we did not operate on children <3 years of age, and this was due to referral reasons.

Endoscopic DCR is not usually indicated in presaccal obstructions, yet in some cases the operation can be the only procedure that can give a chance to make the symptoms better, although the success rate may be lower than in the postsaccal obstructions [6]. In our series, this was observed in five patients in whom the obstruction was either mainly presaccal, or both pre and postsaccal, in whom the symptoms were partially improved.

It is evident that the endonasal approach is preferred in recent papers concerning the pediatric DCRs and it is a highly successful alternative to external DCR in children [6, 12]. The advantages in the endonasal approach especially in children, it avoids a skin incision, does not disrupt the medial canthal structures, the bleeding control in the nose is better and the time of the procedure is also shorter, and in the present study, these advantages were all obtained [6, 8, 11, 12].

Powered endonasal DCR, as described by Wormald, allows an extensive osteotomy to be made and thus enables full exposure of the lacrimal sac, contributing to enhanced success [13]. In the present study, the use of the drill was completely safe with no serious hazards to the surrounding structures.

Silicone tubing is a controversial issue in the literature. Some placed it in all their cases when others used it only in situations in which canalicular stenosis was suspected or in revision cases [6, 9, 12, 14–16]. In the present series, stents were placed on regular basis on the assumption of higher incidence of upper respiratory tract infections in pediatric age group with consequent risk of obstruction of the new ostium.

In a study by Jones et al. [17], the main reasons for failure of endoscopic DCR in pediatrics were craniofacial abnormalities or syndromes. In our series, no such cases were dealt with and the main predictor of incomplete cure is when presaccal obstruction is present.

No major complications were reported in the present series, but minor complications were mainly adhesions in 40 % of cases. Although this complication was considerably lower in Kominek et al. [4] study, they reported orbital fat herniation and premature stent loss. The high incidence of adhesions in our series is probably due to incomplete crust removal on follow up and infrequent visits in some patients. Otherwise no case of fat prolapse occurred. Review of literature revealed no major complication being reported which ascertains that the endoscopic approach is a safe one in dealing with pediatric lacrimal obstruction.

Conclusion

The endoscopic DCR is a safe and effective surgical procedure for children with the congenital nasolacrimal duct obstruction resistant to probing, irrigations and intubations. The predictors of success of the surgery are mainly the level of obstruction, with the postsaccal one being the best candidate for surgery with very good outcome. The second predictor of success in patients with recurrent dacryocystitis is the early referral to proper surgery which reduces the incidence of lacrimal stenosis resulting from infection itself or repeated probing and consequent trauma.

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